Revenue TT.—97.—100,000—21-5-48.

Revenue (1948) Department.

TB-SERIES.

G.O. No. 3748

Dated 27-7-48.

[Despatch Abstract.]

Agriculture - Indian Central Tobacco Committee - Orissa Sub-Committee - Control of - Report on the experiments conducted forwarded -

Sects. II-27—100,000—21-6-52.

Dgrdp (1948.) Department.

Ms. SERIES.

G.O. No. 3948

Dated 27-7-48

[Despatch Abstract.]

Agriculture - Indian Central Tobacco Committee - Orobanche pest - Control of - Report on the experiments conducted forwarded -

GOVERNMENT OF MADRAS
Development Department
***

Lr.No.Ms.3948.

Fort St. George,
D/27--7--1948.

To
The Secretary to the Indian Central Tobacco
Committee,
BOMBAY. (with enclosure)

Sir,

Sub: Agriculture - Indian Central Tobacco Committee - Orobanche pest - Control of Report on the experiments conducted - Forwarded -
Ref: Your letter No.F32(8)/47 dated 3-5-1948.

I am directed to forward herewith a copy of the report on the experiments to combat 'Orbanche' conducted by the Madras Agricultural Department,at Lam Farm, Gundur from December 1942 to March 1948. The Scheme was closed on 1st April 1948.

Yours faithfully,

(Sd.) x x x

Copy to:-
The Director of Agriculture.

---

gs/31-7/

SCHEME FOR THE INVESTIGATION OF THE DISEASES OF VIRGINIA TOBACCO - FINAL REPORT.

...

Introduction.

Tobacco is one of the most important of the industrial crops in the Madras Presidency. The provisince holds more or less exclusive monopoly of cultivation of Virginia Tobacco, the total area under the crop being about one fifth of the total acreage under this crop in India of predivision days.

In this Presidency tobacco is a valuable commodity and is the mainstay of the ryots of the entire Guntur district and part of Krishna district. The total annual yield in this area is estimated at about 60 million pounds per year which is nearly 90% of the total, out of the whole India. In terms of money, the unmanufactured Virginia Tobacco produced in the districts of Guntur and Krishna would amount to nearly 164 lakhs of rupees, Therefore in the economy of the province, the role of the Virginia Tobacco crop is not an insignificant one. Since the late thirties, however, this industry received a serious set back due to the damage caused by the heavy incidence of what is known as the broom-rape parasite, 'Orobanche cernua', and also by fungus diseases in the nurseries and the transplanted crop. Because of the boom in the newly introduced tobacco leaf industry there was a phenomenal increase in the area under Virginia tobacco, and correlated with it the disregard to the practice of rotationof crops. Under these conditions the broom-rape parasite found congenial environment for its multiplication and spread. Within a short period of about three years the entire tract became heavily infected with this obhoxious parasite resulting not only in considerable loss in yield of the crop but also jeoparadising the future of the industry in the province by spoiling the quality of the leaft tobacco.

Inthe Guntur area, in addition to this parasite, tobacco is subjected to a serious disease, the damping off of seedlings, which destroyed the seedlings in very large numbers in the nurseries, resulting in very heavy losses to the cultivator.

The need for combating the 'Orobanche' parasite, and the 'damping off' of seedlings was very keenly felt by the industry in the province and the scheme sanctioned by the Madras Government, which ran for a period of five years and three months, was the outcome of that need.

The scheme was sanctioned in G.O.No.Ms.1968, Development Department dated 19-9-42 for a period of five years and the scheme was started on 7.12.1942, at the Agricultural Research Station, Lam post, Guntur. Proposals for extensionof the scheme for a further period of three years was sent in August 1947, from the date of expiry of the first sanction, to the Government. But sanction was accorded only for a further extension of the scheme by three months ending 31st March 1948. So the scheme started in 7-12-1942 came to a close on 31-3-48.

Investigations.

The scheme had for its programme the following items:

I. Investigation of 'Orobanche cernua
II. Investigationof 'damping off', in the nurseries and,
III. Investigationof other fungi and virus disease of tobacco.

I. Investigation of 'Orobanche cernua': During these years of the scheme a large number of field and pot experiments were laid out with the object of finding out suitable control methods. The following are the results achieved during the period of the scheme.

1. The application of organic materials to the soil: The incorporation of large quantities of Sunflower material to the soil was claimed by certain Russian works to have been found effective in freeing the soil from orobanche by stimulating the seeds lodged in the soil to germinate, but owing to the absence of host plants the parasite, however subsequently perished. To find out if control of the parasite, could be effected in the Guntur area by adopting this method a series of experiments was started in field as well as in pots, and in addition to Sunflower, organic material of Solanaceous origin was also included in the experiments. The results of the experiments tried are given below.

a) Field experiment:

Treatments: 1. Sunflower grown in situ, cut and incorporation in the plot, one month prior to planting tobacco.

2. Sunflower grown outside the plot, cut, dried and then applied to the plot at 33 tons per acre.

3. Equal quantities of Pilipesara applied to the soil (plot) at 33 tons per acre.

34. Control(no treatment).

Lay out: Randomised block with 4 treatments and 6 replications.

The plots were sown with viable Orobanche seeds previously to provide infection for the in-coming crop. The experiment was conducted for a period of three years (1943-46).

The results of the experiments carried out for three years (1943-46) showed that effective control of orobanche could not be obtained by this method under conditions obtaining in the Circars.

(b) Pot culture experiments with organic materials for the control of orobanche treatments;A

Treatments: Sunflower and Pillipesara organic materials at 3 levels of 30, 45 and 60 grams per Kilogram of soil respectively and planting tobacco at varying intervals. The experiments were conducted for three years (1943-46).

The results of the experiments showed that rapes are able to exert their influence and that orobanche seeds are viable even after two years. Regarding the different levels and materials used, the results were not significant.

c) Pot experiments - trials of compost refuse for the control of orobanche; Treatments: Series A: Applying compost of orobance and tobacco refuse at 100 grams per Kilogram of soil and planting tobacco after one fortnight.

Series B. Same as in Series A, but planting tobacco after three years (1946-48) and the results were not significant.

2. Chemicals versus mechanical methods of control of orobanche.

The experiment was designed to find out if the application of certain caustic or other chemicals could be effective in destroying

(contd:-

~~could be effective in destroying~~ the parasite without injuring the host and if effective, what the relative advantage of such a method is over mechanical methods of control, such as pulling out the rape shoots by hand as they appear.

Treatments: 1. Copper sulphate solution swabbed once a fortnight.
2. Ferrous sulphate solution -do-
3. Ferrous sulphate plus copper sulphate swabbed once a fortnight.
4. Agri Tree Killer solution 1:4 swabbed once a fortnight.
5. Hand picking of rapes daily.
6. -do- on alternative days.
7. -do- Once in 3 days.
8. -do- Onee a week.
9. Control (no treatment).

Lay Out: Randomised block of 14 treatments & replicated 4 times.
Size of plot: 4 rows of 12 plants each.
Experimental areas: 2 rows of 10 plants each.

From 1944 - 45, the following treatments were added;

1. 1 lb. of Atlacide in a gllon of water.
2. 2 lb. -do-
3. Agri Tree Killer solution 1:6;
4. -do- 1:8;

Agri Tree Killer solution 1:4 strength was left out in 1947-48. Methoxone 0.2% strength was included as one more additional treatment in 1947-48.

Experiments were conducted during 1943-48. The results of the experiments showed that all the treatments except one were not statistically significant and superior to control either as regards rape incidence or leaf yields. Hand picking daily of the rapes was proved to be superior to other treatments, in one instance, i.e. in the experiments carried out in 1944.

The difficulty as regards chemical treatments is that though some chemicals kill the emerging rapes, they are not able to control further emergence of rapes.

3. Rotation experiments:

An experiment to find out the most suitable rotation of crops for tobacco in relation to orobanche incidence was conducted from 1943-44 to 1945-46 with the following rotation.

	Ist Year.	2nd Year.	3rd Year.
I.	Tobacco	Tobacco	Tobacco.
II.	Pyru jonna	Tobacco	Pyru jonna.
III.	Tobacco	Chillies	Coriander.
IV.	Tobacco	Tobacco	Variga
V.	Groundnut	Tobacco	Maize
VI.	Chillies	Tobacco	Sajja.

The results of the experiments were not statistically significant. This experiment was discarded and another series of rotation with 16 treatments was started in 1946-47 and continued upto 1947-48. It has to run for atleat three years to study the results of the rotation experiment. The experiment was not completed.

p.t.o.

4. Varietal resistance trials:

The relative susceptibility of different varieties of tobacco to the incidence of orobanche was estimated by growing the varieties to be tested in heavily infested soil.

Lay out: Balanced incomplete block arrangement with five replications.

Size of plot: 0.42 cent.

Twantyone varieties were tried for rape resistance. The variety 'Dumbara' was statistically significant and superior to control(H.S.9) as regards rape resistance for the first two years(19444-46) and 13 other varieties in the second year of trial (1944-45). Results were not statistically significant in the other years of trial.

The variety 'Country rat rail' was superior to control as regards leaf yields for two years of trial. In all the trials the departmental strain H.S.9 was used as control.

5. Use of trap crops for the control of Orobanche

During the course of investigations it was found that seeds of Orobanche cernua had a great affinity for Datura fastuosa, a common wild plant growing in the vicinity of cultivationlands. Experiments were laid out to determine if the use of this weed as a trap crop could be adopted in practice for the control of orobanche.

a) Inter cropping Datura with Tobacco.

Treatments: 1. Drilling Datura seeds between rows of tobacco at the time of planting.

2. Planting Datura seedlings between rows of tobacco at the time of plantings tobacco.

3. Control.

As regards incidence of rapes the results were not statistically significant. As regards leaf yields planting Datura seedlings between rows of tobacco, at the time of platnting was better than drilling datura seeds or control for two consequitive years (1945-47).

b) Methods of sowing Datura:

Treatments: 1) Broadcasting the seed and covering with Junioe Hoe
2) Drilling the seed with 'gorru' and covering with'guntaka'
3) Dibbling the sedd behind the country plough.

The experiment was conducted in the year 1944-45 and has been discarded.

c) Datura planting in Pyru and Punasa seasons

Treatments: 1) Planting Datura in punasa season.
2) Platning Tobacco in pyru season;
3) Control.

The ~~centre~~ experiment was conducted during 1944-45 to 1945-46, Results of treatments as regards leaf yields proved that control was better than trap cropping and the results were not significant statisti cally as regards rape incidence in the first year and in the second year trap crop was better. The experiment

/cont'd..

~~experiment~~ was discontinued in view of the poor yields.

d) Monthly planting of Datura:

Treatments: Main.

1. Datura planted, ploughed in and then tobacco planted;
2. Datura planted, pulled out and then tobacco planted.

Sub-treatments.

3. Datura planted in July.
4. Datura planted in August.
5. Control (no treatment).

Lay out: Randomised blocks replicated 6 times.
Size of plot: 37 links X 25 links or 0.925. cents.

In 1947-48 June planting of Datura was discareded for want of rains in time.

Only in one year (1946-47) June and July planted treatments were significantly superior statistically and better than August planted treatments and control as regards rape incidence. Results regarding the leaf yields were not better than control.

6. Agronomic experiments: The effects of ploughing with heavy iron plough as against ploughing with country plough or working with 'Guntaka' for the control of orobanche was studied in a field experiment.

Treatments: A. Ploughing with Victory plough.
B. Working Guntaka alone;
C. Ploughing with country plough (control).

Lay out: Randomised blocks replicated 6 times.
Size of plot: (25 x 99) links.

Though working 'Guntaka' was superior to other treatments as regards the rape incidence the results were not statistically significant as regards leaf yields. The experiment was conducted for two years (1946-48).

Surface cultivation with Guntaka has given significantly less incidence of broom rape without adversely affecting the crop yields.

7. Germination studies of orobanche seeds.

Treatment: Keeping orobanche seeds, collected from 1943 to 1947 intouch with live host plants in between slides for germination studies. The experiment was done in 1946-47. It was noted that seeds collected in 1947 alone germinated.

The orobanche seed under Guntur conditions loses its viability after 2½ years and does not germinate after that period though it is reported from elsewhere that the seed is viable even after 13 years. So if a suitable rotation of crops, wherein the tobacco crop comes in only in the third year or even later is followed, the emergence of orobanche can be checked.

8. Host range of Orobanche.

A number of plants were tested for finding out the host range of Orobanche cernua. It was found that Orobanche is capable of infecting twenty species of host plants as detailed under.

Solanaceae	15 species.
Compositae	2 "
Euphorbiaceae	1 "
Tiliacease	2 "
	--- Total 20 species. p.t.o.

An important discovery made, based on laboratory studies is that the roots of chilli profusely stimulate germinationof Orobanche cernua without itself being parasitized.

II. Investigation of 'damping off' of seedings in the nurseries:-

A large number of experiments, for the control of 'damping off' of tobacco seedlings in the nurseries, were conducted and the results are given below.

1. Experiments on levels of nursery beds, sterlilisation and sprays:-

Treatments:

Main treatments.	
Raised beds.	Low beds
1. Heat sterlized.	1. Heat sterlized.
2. Non-sterlilized.	2. Non-sterlilized.

Sub-treatments

1. Bordeaux mixture 1% strength.
2. Bungundy mixture 1% strength.
3. Colloidal copper 1% strength
4. Control (no spraying).

Lay out: Split plot randomized 6 times.
Size of beds: 4.50 feet x 6.0 feet.

The experiment was conducted in the sandy and black soil areas from 1943-44 to 1947-48. that is for complete five years.

In the first year of the experiment (1943-44) Bouisol was used as one of the sprays in the sub-treatments. Subsequently it was substituted by Gungundy mixture 1% strength from the second year (1944-45) as Bouisol could not be procured due to import restrictions.

From the third year (1945-46) Colloidal copper 1% strength was left out due to its very poor performance in the previous years.

The different sub-treatments were sprayed at fortnighly intervals commencing from the 21st day after sowing. The resul s of the experiments were evaluated on the basis of surviving seedlings.

Conclusions:

1. As regards the levels of nursery beds, it is found that there is no difference between the raised or low beds of nursery. In all the five years the results were not statistically significant.

2. Except for 1945-47, in the rest of the years, sterilisation of nursery beds has not proved better than non-sterilisation. There was no significant difference between sterilisation and non-sterilisation of the nursery beds.

3. Among the fungicides tried Bordeaux mixture 1% strength proved to be the best spray, Burgundy mixture 1% strength. Colloidal copper 1% was never better than Bordeaux mixture or Bungundy mixture in any of the years. Due to its poor performance, Colloidal copper was left out since 1945-46.

~~2. Experiments~~

contd:-

2. Experiments on the optimum strength of fungicides and frequency of application.

Treatments:

Maint treatments.

1. Spring Spraying once a fortnight.
2. Spraying once a week.
3. Spraying once in 3 days.

Sub treatments.

1. Spraying Bordeaux mixture 1% strength.
2. " " ½% "
3. " Burgundy mixture 1% "
4. " " ½% "
5. " Colloidal copper 1% "
6. " " ½% "
7. Control (no spraying)

Lay out: Split plot randomised 6 times.
Size of plot: 4.50 ft.x 6.00 ft.

The experiment was started in 1943-44 and continued to the end of the scheme both inthe black and sandy areas. The nursery beds were sprayed at the respective stated strength and intervals at the uniform rate of 5 gallons per cent of seed bed area. The sprayings were done twentyone days after sowing and continued for two fortnights.

Results of the first year (1943-44) were not taken into account for want of disease incidence.

Conclusions:

1. Results of experiments from 1944 to 1946 gave significant conclusion as regards spraying once in 3 days followed by spraying once in a week and once a fortnight. In the other two years (1946-48) there was no significant difference between the intervals of spraying.

2. All the strengths of fungicides were significantly superior to non-sprayed treatments. Regarding the different strengths of the spray treatments, 1% strengths were better than ½% strengths of the fungicides. In all cases the different strengths of colloidal copper were not superior to the other strengths of Bordeaux mixture and Burgundy mixture. One percent strengths of Bordeaux and Burgundy mixtures were on par though superior to other spray treatments.

3. Optimum quantity of 1% Bordeaux mixture for the control of 'Damping off' of tobacco:

Treatments:
1. Bordeaux mixture 1% at 500 gallons per acre.
2. " " 750 "
3. " " 1000 "
4. Control (no spraying)

Lay out: Split plot - randomised 6 times.
Size of bed: 4.50 ft. x 6.00 ft.

In 1945-46 instead of 1000 gallons per acre, 250 gallons per acre was used in treatment No.3 above. The experiment was started in 1944-45 and continued to the end of the scheme. The experiments were conducted both in the black and sandy soils. The first spraying was given 3 weeks after sowing and two more sprayings at fortnightly intervals.

Conclusions:

1. In all the years, all the spray treatments gave significant results and proved superior to non-sprayed treatments.

2. All the levels of 1000, 750 and 500 gallons per acre respectively were on par and superior to control and there was no difference between the three quantities tried.

p.t.o.

4. Experiments on seed rate and spraying nurseries.

Treatments: 1. Seed rate at 1.25 tolas per cent.
2. " 1.00 " "
3. " 0.75 " "
4. " 0.50 " "

The above treatments were elaborated from 1945-46 as follows:
1. Spraying once a fortnight with Bordeaux mixture 1% and (2) no spraying. In 1946-47, the experiment was further elaborated by adding 1.50 tolas per cent to be followed by two over sowings at 0.50 tola per cent each time. The experiments were conducted both in the black soil and sandy areas.

Lay out: Split plot randomised 6 times.
Size of bed: 4.50 ft. x 6.00 ft.

Conclusions:

1. The results of the spraying versus non-spraying experiments showed that in all cases the sprayed treatments were superior to non-sprayed. The results were statistically significant in all the years of trials.

2. The differences between the different rates of seed sown for the nurseries were not significant in all the years except in the last year. The the last year 1.50 tolas per cent proved superior to other seed rates.

3. Experiments on seed treatments and spraying for the control of damping off.

Treatments:

Main treatments.

1. Spraying 1% Bordeaux mixture at fortnightly intervals from 21st day after sowing.
2. Control (no spraying).

Sub-treatments.

Seed treatments before sowing with:

1. Silver nitrate solution.
2. Copper sulphate solution.
3. Mercuric chloride solution.
4. Formalin;
5. Control (no treatment).

From 1946-47 one more sub-treatments, that is treating seeds with fine sulphur 0.4% was included. In 1947-48 Mercuric Chloride treatment was discarded and Ceresan was tried in its place. The experiments were conducted both in black soils and sandy areas. The eperiment was started in 1945-46 and continued to the end of the scheme.

Lay out: Split plot randomised 6 times.
Size of beds: 4.50 ft. x 6.00 ft.

The seeds were treated with the different fungicides before sowing and the nurseries were sprayed once a fortnight with 1% Bordeaux mixture from the 21st day after sowing. Results were based on the number of surviving seedlings.

Conclusions:

1. In all the three years the results of spraying proved superior to non-spraying. Differences between spraying and non-spraying were statistically significant.

2. The results between the different seed treatments were not significant except in 1947-48, when fine sulphur (0.4%)

/contd:

was found to be significantly superior to other seed treatments. In 1946-47 seeds treated with Mercuric chloride was found to be inferior to control.

6. Experiments on water requirement.

Treatments: 1. Watering 2 times a day.
2. " 3 "
3. " 4 "
4. " 5 "

Layout: Split plot randomised 6 times.
Size of bed: 4.50 ft. x 6.00 ft.

The experiment was started in 1946-47. The nurseries were watered at the above stated intervals from the tenth day after sowing. The experiments were conducted both in heavy soils and sandy areas.

The analysis of the results of 1946-48 were not significant statistically between the different intervals of watering the nurseries.

Econimics of the various treatments.

In the experiments tried, the results were all identical and spraying with Bordeaux mixture, 1% strength was found to be superior. As there was no significant difference between the different quantities of the spray fluid, 500 gallons per acre of the mixture can be taken as the most economical rate for the control of 'damping off' both in the heavy soils and sandy areas.

The economics of the various treatments which were consistantly superior to control in the various experiments conducted, were worked out and the following were the net gains per acre over control.

Treatments.	Black soil area.	Sandy area.
1. Bordeaux mixture 1%	Rs.1,500 to Rs.2,600	Rs.1,000 to 4,000
2. Burgundy mixture 1%	Rs.1,600 to Rs.2,500	Rs.1,100 to 3.000
3. Colloidal copper 1%	Rs.1,000 to Rs.1,700	Rs. 200 to 2,900

The value of increased yield of seedlings were calculated at the average actual rates of sale effected, which ranged from Rs.1-4-0 to Rs.30/- per thousand seedlings. The cost of the treatments was deducted in claculating the net gain.

III. Investigation of other fungus and Virus diseases of tobacco.

1. Control of Cercospora spot on tobacco.

Treatments: 1. Planting seedlings with Cercosphora spots;
2. " after removing affected leaves.
3. " after dipping in 1% Bordeaux mixture.
4. " after removing the affected leave and then dipping in 1% Bordeaux and then dipping in 1% Bordeaux mixture.
5. Planting disease free seedlings - priming at intervals.
6. Control (planting disease free seedlings without any treatment).

Lay out: Randomised blocks replicated 4 times.
Size of plot: 4 rows of 7 plants each.

There was no disease incidence from 1943-44 to 1947-48.

p.t.o.

There was no incidence of the disease during the two years of the trials.

3. Experiments for the control of Mosaic disease.

Treatments: Main treatments.

1. Observing sanitary practices;
2. Control

Sub-treatments.

1. Planting Mosaic free seedlings.
2. Control.

Lay out: 3 rows of 5 plants each replicated 6 times - randomised blocks.

B) Treatments:

Sowing seeds after treating them with the following Chemicals.

1. Copper sulphate;
2. Mercuric chloride;
3. Silver nitrate.
4. Formalin.
5. Fine sulphur;
6. Control (no treatment)

Lay out: 3 rows of 5 plants each replicated 6 times - randomised blocks.

The experiments were conducted during 1946-47 to 1947-48 There was no incidence of the disease during the period of the trials.

gs/31-7/

2. CONTROL OF MILDEW ON TOBACCO.

Treatments: 1. Sulphuring the soil around the tobacco plant.

2. Removing the lower leaves which transmit the disease from the soil to the upper leaves;

3. Control (no treatment).

Lay out: Randomised blocks replicated 6 times.

Size of plot: 2 rows of 3 plants each.

The experiments were conducted from 1946-47 to 1947-48. There was no incidence of the disease during the two years of the trials.

Copy of letter No.32(8)/47, dated 6th December 1948 from the Secretary, The Indian Central Tobacco Committee, Bombay addressed to the Secretary to Government of Madras, Development Department, Madras.

Subject:- Orobanche pest -Control of - Report on the experiment conducted.

Sir,

I have to invite a reference to your letter No.3948 dated the 27th July 1948 on the subject noted above and to say that the report forwarded therewith has since been examined by the Committee's Director Tobacco Research, who has observed as under:-

"Considerable amount of work has been done and it will be useful if the experiments are written up for publication. It is not possible from the present report to appraise the scientific value of the investigations, as only bar summaries and statements are given. For example it is not known whether or not the author isolated the pythium organism and multiplied it to infect the experimental beds uniformly, so that the fungicidal action of the various strengths of Bordeaux Mixtures and other chemicals could be tested more correctly. If this has not been done, then it would not be possible to say whether or not the strength of the Bordeaux Mixture, as advocated, would be able to control 'Damping off' under more severe conditions.

There is no evidence in the report to show that certain conclusions have been corroborated on farmers' fields. If this has not been done, it will be desirable to test certain of the findings on the farmers' fields before issuing pamphlets on the subject. If, however, the author feels confident that certain of his results can be successfully introduced in general practice, then it will be desirable that leaflets are issued in vernacular language for general publicity.2"

2. This Committee will be grateful for the comments of the Provincial Department of Agriculture on the observations of the Director Tobacco Research.

Yours faithfully,

(Sd.) C.Ramaswami Naidu,
SECRETARy.

---

gs/31-7/

Copy of letter No.D.2.58/49 dated 19-2-1949 from the Director of Agriculture, Madras addressed to the Secretary to Govt., Development Department, Fort St. George, Madras.

Sir,

Sub: Agriculture - Tobacco - Diseases - Orabanche Control of -Experiments in -Report of -
Ref: Government Endt.No.133093.A.II/48-1 Development dated 21-12-1948.

I furnish herewith my remarks on the points raised in the letter of the Indian Central Tobacco Committee.

The organism causing damping off has been isolated from Guntur soils and indentified as Pythium aphanidermatum which on inoculation on tobacco seedlings proved pathogenic and caused typical damping off.

In the field experiments care was taken to select only such sites as would ensure an even infection of the different plots by natural infection and the experiments were laid out in randomized replicated plots and the untreated plots acted as checks on the treatments, furnishing an index to evaluate the efficacy of the various fungicides. The data were analysed statistically and definite conclusions were drawn only when the results were statistically significant with a high percentage of death in the controls. The technique followed is therefore as per accepted standards in regard to the conduct of such experiments for testing the efficacy of control methods in regard to soil pathogens.

Infecting the soil artifically and multiplying the inocul in the soil will be all right in case of small scale pot experiments, but as there are innumerable facto s controlling the spread of inoculum in the soil in the field, in large scale field experiments the methods would lead to misleading conclusions as an even quantity of inoculum in all the plots can never be ensured. The method of randomized replicated plots with sufficient number of controls for comparison would appear therefore to be the better proceedure.

Moreover, one of the treatments included in the trials for the control was soil sterilization by heat and for the inclusion of this treatment it was considered best to do the experiment in naturally infected plots.

Bordeaux mixture treatment for control of damping off has been extensively tried in farmers fields and is becoming popular in the tracts. The Provincial department has been doing propaganda for the popularisation of this method of control for the last three years and wide publicity has been given through the Villagers Calendar and other departmental journals like Mehzichelvam and Paddipantalu.

They may be communicated to the Committee.

(Sd.) C.R. Srinivasa Iyengar,
for DIRECTOR OF AGRICULTURE.

---

gs/31-87/

GOVERNMENT OF MADRAS
Development Department.
***

Lr.No.133093.A./48-2. Fort St. George,
D/3-3-1949.

To
The Secretary,
The Indian Central Tobacco Committee,
"White Lodge,", 48, Harington Road, Madras.

Sir,

Sub: Agriculture - Orbanche pest - Control of - Report on the experiments conducted -
Ref: Your letter No.32(8)/47 dated 10-12-1948.

I am directed to enclose a copy of the letter No. D.2.58/49 dated 19th February 1949 received from the Director of Agriculture, Madras containing the information required in your letter cited.

Yours faithfully,

(sd.) x x x

Copy to
The Director of Agriculture.

---

gs/31-7/

Copy of letter No.F.32(8)/47, dated 19th June 1949 from the Secretary, The Indian Central Tobacco Committee, 48, Harrington Road, Chetput, Madras addressed to the Secretary to the Govt. of Madras, Development Department, Madras.

Subject: Orobanche pest - Control of - Report on the experiments conducted -

---

Sir,

I have to refer to your letter No.133093AII/48-2, dated the 3rd March, 1949, on the above subject and to say ~~that~~ that the Director, Tobacco Research, has made the following observations on the remarks of the Director of Agriculture, forwarded therewith.

"Without entering into detailed criticisms of the view expressed by the Mycologist, I am constrained to further observe, in continuation of my memorandum of 21st October 1948, that it is really surprising that the pythium organism isolated by him should not have been used to infest the plots uniformly. It is well known that the effective strength of the fungicides cannot be properly determined until one is able to know approximate optimal intensity of the pathogen in the soil during the course of investigation. Since the investigation suffers from an important fundamental defect its findings cannot be construed, without doubt, to have determined the specific strength of the Bordeaux mixture for the control of damping off in tobacco nurseries."

Yours faithfully,

(Sd.) C. Ramaswami Naidu,
Secretary.

gs/31-7/

/True Copy/

Superintendent,
Madras Record Office.

4-8.